

ART. III.—A CLINICAL AND THERAPEUTICAL
CONTRIBUTION TO OUR KNOWLEDGE
OF CERVICAL PARAPLEGIA.

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I PRESENT the following histories of cases to illustrate the semeiology of cervical paraplegia, and to demonstrate that the disease, in some of its forms, may be checked or even cured.

CASE I.—Atrophic paralysis and anæsthesia in both hands; symptoms of weakness and stiffness in the legs; removal of these symptoms, and permanent arrest of the disease.

Dr. R—, U. S. Army, aged 41 years, first consulted me in 1873, and related the following history: Had always enjoyed good general health, never had syphilis, or been injured about head and spine, but had been much exposed to hardship and overwork in his army service. In December, 1870, he suddenly experienced diplopia with internal strabismus due to palsy of the left sixth nerve. This was not preceded or accompanied by neuralgia or by general symptoms. This affection gradually disappeared in the course of two months.

In July, 1871, the present disease made its appearance. Dr. R. was then in camp, and had been much exposed in severe marches. On arising one morning he noticed a marked degree of palsy in his left hand, the abduction of the thumb being impossible and opposition almost lost. At the same time both hands felt stiff and numb, though whether this was from palsy or from cold he could not decide. Dressing was very difficult that morning. The result of this attack was marked palsy of parts of the left hand and slight impairment of the motor functions in the right. The doctor cannot state positively what was the condition of sensibility in the right hand at that time. Three months later neuralgic pains ap-

peared in the left thumb and forearm, and at the same time the thenar eminence on the left side began to waste rapidly. About the same time a diffused (corset-like) sense of constriction was noticed round about the chest, extending from beneath the clavicles to the lower ribs. At that time there was no palsy or wasting of the right hand; no symptoms in the face. The gait was unsteady, and fatigue easily produced. Closing eyes and attempting to walk in darkness made this unsteadiness greater. Late in the autumn of 1871 numbness (anæsthesia?) was first positively noticed in the ulnar distribution of the right hand, and this has since increased. At that time there was no numbness on the left side. This hand first became numb in the summer of 1872, one year after the palsy.

During the past six months the atrophy of the left hand has increased, as well as the anæsthesia. During this period the right thenar eminence has shown a beginning of atrophy about its centre (flexor brevis pollicis); the abductor indicis and the dorsal interossei also show some wasting. The fingers have been very awkward in use; the medius and annulus seeming to stick together. There has been much increase in the anæsthesia of the right hand. No general symptoms have appeared except moderate emaciation.

Examination.—The patient is a tall spare man of good muscular development, and no sign of disease except his wasted hands. Nothing abnormal about eyes, internally or externally. Facial muscles act well. On the left side there is a considerable area of partial anæsthesia in the range of distribution of the superficial branches of the supra-orbital, infra-orbital, and malar branches of the fifth nerve. Contact is hardly felt in this region, but painful impressions are perceived. The upper part of the trunk is the seat of much numbness, and some anæsthesia (?). At times it seems to patient as if a cinch were round about him, extending as low down as the false ribs and the umbilicus. No such sensation lower down.

Both hands are the seat of muscular atrophy and anæsthesia distributed as follows: The left hand is extremely wasted. The small muscles of the thumb have disappeared with the exception of the inner part of the flexor brevis and adductor.

Complete extension and opposition of the thumb are impossible. The muscles of the hypothenar eminence, and the interossei are uniformly wasted. The atrophied muscles yield no contraction to the strongest faradic current, and only slight fibrillary contractions to the interrupted current of thirty-two elements of Stöhrer's galvanic battery.

The right hand exhibits very moderate wasting of the interossei, and a narrow streak ($\frac{1}{2}$ inch wide) of positive atrophy in the abductor and opponens pollicis. The interossei controlling the index and middle fingers are most affected. The various muscles of the hand, excepting the atrophied band in the thenar group, respond well to both currents. The handwriting is much altered and laborious; the patient feeling as if the difficulty were one of inco-ordination, though this is not strictly correct. On neither side is there the *main-en-griffe* which is so characteristic of extreme palsy of the interossei. The forearms and the rest of the body are free from paralysis or atrophy.

Sensibility is much impaired in both hands, but more in the right; so that we see in this case an imperfect example of the phenomena accompanying a lesion in one half of the cord. The degree of tactile anæsthesia is great, but pain and temperature are everywhere perceived when the stimulus is sufficiently strong. In the right upper extremity the loss of sensibility is in the inner (ulnar) side of the lower arm, forearm and two-thirds of the hand, the whole of the fingers and part of the thumb anteriorly. The left upper extremity exhibits a patch of anæsthesia a little different in shape. Anteriorly, the inner (ulnar) half of the lower arm and of the forearm is slightly anæsthetic, and the same is true of the same parts of the posterior aspect of the forearm and hand. In the hand the anæsthesia almost follows the distribution of the ulnar nerve.

There is a faint feeling of numbness in the remainder of the upper extremities as high as the acromion processes, but there is no true anæsthesia.

In the lower extremities there is nothing objectively abnormal. At times there is marked uncertainty in walking, patient feeling in danger of staggering against persons and

things. There is no ataxia, and while standing with eyes closed no great oscillation. The doctor was formerly a great walker, but now he is easily fatigued by half a mile of promenade. No rectal or vesical symptoms.

Diagnosis.—I reject progressive muscular atrophy, because of (1) the paralytic onset; (2) the occurrence of anæsthesia; (3) the limitation of disease to the hands; (4) the want of symmetry in the wasting. There was probably a small hemorrhage in the spinal cord at the time of sudden paralysis of the left hand. If there was a clot it must have been very small, and was located in the left anterior grey horn in the middle of the cervical enlargement. From this focus a myelitis has extended in a direction chiefly downward and across the median line. The most remarkable feature of the case is the grouping of symptoms in the order assigned by Brown-Séquard to spinal hemiplegia, i. e., more palsy on one side (same side as lesion of spinal cord), and more anæsthesia on the opposite side.

During the autumn and early winter of 1873 I treated Dr. R. systematically. The local treatment, having for its object the improvement of the atrophied muscles, consisted in thorough galvanization of the parts, friction, etc. A few fibres of the left thenar eminence seemed to revive and grow after weeks of patient care, but no real progress was made.

It was otherwise with the internal treatment. Under the use of nitrate of silver, arsenic, cod liver oil, etc., the myelitis was undoubtedly arrested. Before leaving for the Pacific coast early in 1874 Dr. R. could walk much, felt less inclination to stagger, was much less conscious of the cuirass feeling, and gained a great deal in general vigor.

Dec. 1, 1875. In the last eighteen months no medicines have been taken, yet the disease has made no progress. The hands are about the same, he has hardly any sense of constriction about the thorax, he walks perfectly well, and his health is good.

Looking over the history and progress of the case in the light of recent discoveries in the pathology of spinal paralysis, I am disposed to modify my first diagnosis somewhat. I adhere to my denial that the case was one of progressive

muscular atrophy, but doubt if at any time there was hemorrhage in the cord. The original lesion may have been a rapidly-developed limited myelitis in the left anterior grey horn in the lower cervical region, with subsequent chronic myelitis in various directions, chiefly across the median line, backward and downward. The case bears a certain resemblance to cases of acute spinal paralysis in the adult. The weight of evidence is very nearly equally in favor of both my hypotheses.

1877. I have several times met Dr. R. in the last two years, and he has always expressed himself as perfectly well except in his hands, which remain as they were in 1873. All signs of active myelitis have long since disappeared, and we may assume that the disease has definitely come to a stand-still.

CASE II.—Atrophic paralysis in both hands with slight anæsthesia; neuralgic pains in both arms; weakness of legs. Treatment by active counter-irritation, mercury and iodide of potassium, galvanism; cure.

Mrs. H., aged 53 years, was brought to me by my friend Dr. Conrad of this city, on July 30, 1877. I obtained the following history: Some time during January of the present year she began to experience pain and numbish sensations in the tips of the index and medius fingers, later in thumb and palm of hand. There were no abnormal sensations in the ring and little fingers. The left hand alone was at first affected. She thinks that previous to January she had had some pains in arms, but cannot describe them. These pains (those occurring in late winter) were followed by weakness and wasting of the hands.

In May, when seen by Dr. Conrad, there was the following condition: The right hand was only a little weak; the left was the seat of neuralgia and numbness as above described, the left thenar muscles were atrophied, and there was marked loss of power. Since that time the pains have been more clearly neuralgic, following the course of the median and ulnar nerves from the palms to the bends of the elbows, occurring in paroxysms every ten or thirty minutes, very seldom affecting both arms at the same time. There seemed to be more pain on the right side. About the middle of June numbness showed itself in the tips of the medius, index,

thumb and palm of right hand. No numbness in range of radial and ulnar nerves. Closing hands has made the pain worse; feeling in fingers and palms is a sore, scalded sensation. Has had some pain in the middle of the back below the shoulder; no spinal pain strictly speaking; no cerebral symptoms; no numbness in feet, but legs *have been weak*; no spinal epilepsy or cincture feeling. Complains of slight dysphagia.

Dr. Conrad has given the patient small doses of biniodide of mercury and iodide of potassium, and had applied an ascending stable galvanic current from the hands to the back of the neck.

Examination.—Slight but distinct tactile anæsthesia in fingers supplied by median nerves (including inner half of annulus); for example on the tip of the middle finger the points of the æsthesiometer are distinguished only at 4—5 mm. apart. There is marked paresis of both forearms and hands. Left hand tremulous. The only atrophy visible is in the outer part of the left thenar eminence. The other muscles are weak but not visibly wasted. A faradic current applied to the median and ulnar nerves (nerve current) produces contractions in all muscles except the part of the left thenar eminence which is wasted. The median nerves are not tender or unduly irritable under pressure in any part of their course.

The patient has had several miscarriages and other symptoms which justify a suspicion of syphilis. Has been taking thirty grains of iodide of potassium a day, and galvanism.

I made the diagnosis of central myelitis in the upper part of the cervical enlargement, chiefly in the left half of the organ, involving the anterior grey horn. My advice was to ensure absolute rest for the hands and arms, patient not even to feed or dress herself; to apply mercury by inunction, and to give the iodide of potassium in much larger doses. The actual platinum cautery was shortly applied over the upper cervical vertebræ.

August 11. Again seen with Dr. Conrad. Patient is no worse as regards pain and atrophy. The legs are perhaps weaker. Mercurial ointment to the amount of 3 i. has been used without effect on the gums; has had 3 ii. of iodide a day. Advise repetition of cautery every other day, the use of

3 iii. iodide per diem, more innnction, also 3 i. of Squibbs' fluid extract of ergot at bed time. Mrs. H. has been rather careless in respect to resting hands. She is strongly urged to do nothing whatever with them. Very mild galvanism to arms and spine.

Sept. 11. Patient is better in some respects. There is no increase of wasting, less pain and dysæsthesia in fingers. Legs are weak, but without increased reflex. In the night the hands become clenched. A little tremor is observed in the lips. Treatment has been faithfully pursued: counter-irritation, rest, biniodide of mercurry and iodide of potassium in large doses; ergot up to 3 ii. at night. The gums have been kept a little tender. During the winter iodide of potassium internally, and galvanism to the hands and spine in the shape of the ascending stable current, constituted the treatment. Almost absolute rest was enforced. Improvement appeared and continued.

March 9. Seen with Dr. Conrad. Patient is practically cured. The muscular masses of the hands are fully restored; grasp is good. Very little neuralgic pain is now felt in the arms, but lately some pain has appeared in elbows and knuckles. There is a mere trace of numbish feeling in the fingers. Legs only feel weak after going up stairs. Continues iodide and galvanism.

A few weeks ago, in May, I met Dr. Conrad, and he informed me that with the exception of occasional neural pains, his patient was perfectly well.

In concluding this case I would express my thanks to Dr. Conrad for his courtesy in allowing me to make use of it, and would congratulate him upon the skill with which he carried out the treatment agreed upon.

CASE III.—Extreme anæsthesia of both upper extremities and of the upper part of the trunk; atrophic paralysis of the right hand and of many muscular groups of the left upper extremity; contraction of the left pupil. No symptoms in the lower limbs except rigidity in the left leg. Central myelitis in the cervical enlargement of the spinal cord, with probable formation of a cavity.

Annie M——, single, aged 23 years. Seen at the Manhattan

Hospital, May 18, 1878. When twelve years of age patient's ankles were weak for two years, but entirely recovered. Five years ago, when eighteen years old, she noticed numbness in the tips of the fingers of both hands, extending to the shoulders in the course of a few months. The legs were not numb. Next there began wasting of the left shoulder, hand and arm. Since at least two years the left arm has hung useless by her side. The right hand has wasted more recently. Has felt fibrillary contractions from the start, and believes that sensibility was early lost in the hands. The left leg is weak, and in the last three months it has been getting very stiff. At night her whole body jerks. Micturition is only slow; constipation is present; menses are regular. No dyspnoea or palpitation. Has some occipital headache. According to patient's statement, feeling in the feet and legs is normal, though at times the left foot tingles. Has never had neuralgic pains in arms or legs. General health good.

Examination.—Both pupils are small and equal in a bright light; in the shade the left does not expand, while the right does. No paralysis, atrophy, or anæsthesia in the face. Face not flushed. The upper part of the thorax and the shoulders present marked anæsthesia and analgesia; in the upper part of the back and shoulders behind, sensibility to touch and pricking is fair. In the arms, forearms and hands sensibility is wholly lost; patient has often burned herself without knowing it. The left upper extremity is extensively paralyzed, while the right is only partially so in the hand. State of muscles: On the right side only the interossei are weak and wasted. On the left side the following muscles are atrophied and palsied: interossei, biceps, brachialis anticus, supinator longus, supra and infra spinati, and deltoid. The flexors and extensors of fingers and wrists, the triceps and pectoralis are simply feeble. The scapulæ are not winged; there is a slight dorsal spinal curvature convexity to the right; no kyphosis; standing with eyes closed is difficult; left lower extremity is the seat of increased reflex and epileptoid trepidation. No atrophy or paralysis of lower limbs. Measurements: right calf, 32 c.; left, 31 c. Tendon (knee) reflex increased on both sides.

Re-examined in bed, May 19, 1878. The face presents only the symptoms above noted. The upper extremities, as high as the insertion of both deltoids, are perfectly anæsthetic to touch, reasonable pricking and pinching, and to firm grasp. On the upper thorax and back on the shoulders, she feels touch fairly well, but pricking very little. In front, normal sensibility reappears at the level of the fourth rib. On the back the limiting line is indistinct and seems to be somewhat below the spines of the scapulæ. Motor symptoms in arms as above. The lower limbs and the abdomen present no anæsthesia. Legs and thighs are well nourished; left calf very firm; left toes are "en griffe;" foot not inverted. Patient's mother states that her left leg is very stiff in bed and on first rising in the morning, but after walking it becomes more limber. Patient denies having a cincture feeling or dyspnœa. When numbness appears in the left leg (rarely) it extends to the knee, but patient qualifies the statement by saying that the feeling is more like cramp. At the age of twelve years it would seem that patient had an attack of palsy in the left leg below the knee; the leg and foot were swung heavily for awhile. At that time the left arm was not affected. She recovered perfectly in two years. Every symptom now observable in the left leg and foot has appeared within the past year. The temperature of the hands, taken for three minutes with a Casella thermometer, placed between the index and medius, is on the right side $94^{\circ} 5'$, on the left 95° .

Electrical examination, June 3d. Faradic current, right upper extremity. All muscles give good reaction except the outer group of dorsal interossei. Left upper extremity, good reaction in trapezius, pectorals, triceps; proper extensors of wrist and fingers; faint reaction in long flexors of wrist and fingers, inner third of deltoid, opponens pollicis; no reaction in hypothenar group, inner part of thenar group, interossei, supinator longus, and biceps.

It is plain that in this case there is a great lesion in the cervical enlargement of the spinal cord; probably a diffused central myelitis with formation of a cavity. The lesion was first developed in the æsthesodic tract of the cord, and is yet greater there than in the kinesodic system, though the anterior horns,

especially on the left side, have become involved. The cilio-spinal centre in the left side of the cord is injured, as shown by the contracted pupil. It is noteworthy that no symptoms of vasomotor paralysis are present, thus affording a demonstration of the independence of the cilio-spinal and facial vasomotor centres. The symptoms in the left lower extremity point to the existence of secondary descending degeneration in the lateral column.

It is very remarkable that with so much disease in the cervical enlargement, the various nervous conductors for the lower limbs and abdomen should not be interfered with. As regards the uppermost limit of the lesion, that cannot be above the origin of the fifth cervical nerve, as the diaphragm acts perfectly.

A few words as regards the pathology of these cases.

In all three the æsthesodic, kinesodic, and musculo-trophic tracts in the cervical enlargement were affected.

In cases II. and III. the affection was probably inflammatory—perhaps syphilitic in case II. In case I. a doubt may exist as to whether hemorrhage took place, or whether there was a suddenly developed (as in infantile poliomyelitis anterior) inflammatory lesion. Even if there was hemorrhage at first, a secondary adjacent inflammation occurred and presented many of the symptoms. I am disposed to believe that a central cavity has formed in the cervical region in case III., because of the resemblance of this case with the cases of central myelitis with formation of cavities reported by Schueppel, Hellepeau, and others.

As regards therapeutics, the exceedingly satisfactory issue in case II. was perhaps obtained because the lesion was essentially syphilitic, and the proper remedies were freely and persistently used. Yet I am disposed to attribute much of the recovery to the almost absolute rest enforced. On careful consideration, in view of the apparently progressive nature of the lesion, the issue in case I. is almost as gratifying. True, the atrophied and anesthetic hands were not restored, but symptoms which seemed to point to approaching general paralysis were permanently dispelled. Case III. has been but a few days under treatment, and is a very unfavorable one.